

THE COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT  
DIVISION OF OCCUPATIONAL SAFETY  
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM  
[www.mass.gov/dos](http://www.mass.gov/dos)

## Health & Safety Guidance for Removal of Guano

Guano (bird feces) and other organic matter (feathers, bones, body parts, carcasses, etc.) may pose a health threat to human beings who come in contact with them or inhale the airborne particles from them. Every precaution should be taken to ensure that renovation workers and building occupants are protected from the diseases carried or transported by avian species.

Exposure to bird droppings and nesting materials under ideal conditions can result in a number of diseases, including *histoplasmosis*, Newcastle disease, *cryptococcosis*, pseudotuberculosis and other avian transmitted diseases. Another major condition of concern would be hypersensitivity pneumonitis. This disease is generally contracted by inhaling a specific type of bacteria (*thermophilic actinomyces*). The ubiquitous organisms, whose primary purpose is the decomposition of organic matter, have been isolated from manure, bird droppings, grain compost, hay, etc. *Thermophilic actinomyces* are generally not a concern in the indoor environment. The presence of nesting birds in any portion of the building HVAC system and the potential introduction of the associated diseases that they cause become a real concern.

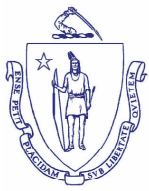
The Division of Occupational Safety (DOS) has developed the following guidance from several sources (see Reference section) to help you manage, or contract for the removal of guano in a safe and healthy manner.

This guidance document is intended for use in situations where there is a considerable infestation and/or significant amount of guano present. Areas of slight infestation and lack of an appreciable quantity of guano do not need to be addressed by following the entirety of this document. Small cleanup situations can be accomplished using basic protective equipment and/or disinfectant.

If you are soliciting bids, be sure your “project description” or “scope of work” section addresses each of the following. Otherwise, be sure the contractor you hire provides you with a written assurance of how each of the following will be met. This guidance does not supersede or preempt any other requirements (i.e. bidding rules) that may apply to the project.

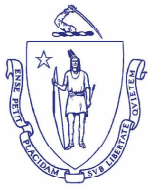
1. Describe specifically what work will be done on the structure to prevent future infestation of pigeons, PRIOR to the removal of the guano.
2. Outline specifically the areas where the work will be performed.
3. State and explain exactly what work will be done (e.g. remove guano physically with shovels, scoops, scrapers, wire brushes, etc.) Prior to removal, all materials to be removed—guano, bird feathers, body parts, insulation—must be wet down with water or a water and bleach solution (1:10) to minimize any airborne dust potentially containing any vector borne organism. If it is not possible to wet the area down prior to removal, it would be essential to use HEPA vacuums to remove any “fines” not removed by shoveling or bulk methods. HEPA vacuums are equipped with special filters which are 99.97% efficient in removing monodisperse particles of 0.3 microns in diameter.
4. State specifically the areas to be decontaminated (e.g. floors, walls, beams, support beams, cross members, horizontal and vertical surfaces of beams, 2x4's, sill areas around windows, etc.)
5. Specify the biocide(s) to be used in the decontamination process. Provide Material Safety Data Sheets (MSDSs) for biocides to the contracting entity. Complete sterilization of the site would require the use of formaldehyde or formalin in varying concentrations. According to the Center for Disease Control (CDC), formaldehyde is the only biocide capable of destroying the fungus and fungal spores associated with *histoplasmosis capsulatum*. Since the use of formaldehyde would, at a minimum, increase the workers and building occupants potential exposure to a confirmed carcinogen (agent likely to cause cancer), there would be very few instances in which this material would be used. The intended use of the biocide during the removal of guano and associated contaminated material is to provide disinfection (decontamination) rather than sterilization. Any biocide approved as a tuberculocidal, including bleach in a 1/10 to 1/100 dilution, is sufficient to destroy most organisms associated with guano, with the exception of the fungal spores of *histoplasmosis capsulatum*.

If there is any doubt whether or not a biocide is approved for this use, that determination can be made by closely examining the product label or the MSDS. Verification can also be made by contacting the manufacturer directly. The manufacturer's name and phone number will be on the product label or the MSDS. You can also call the Environmental Protection Agency (EPA) directly or contact the National Antimicrobial Information Network (NAIN) at Oregon State University (1-800-447-6349).



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6. Indicate if porous surfaces (old beams, wood floors, etc.) will be encapsulated after they have been cleaned.
7. If an encapsulant is going to be used, provide an MSDS for the encapsulant to the contracting entity.
8. List the name and qualifications for the project supervisor.
9. List the types of PPE (personal protective equipment) to be used by personnel performing the abatement. At a minimum, personnel should wear protective suits which cover the head and feet, such as disposable tyvek type jumpsuits. Rubber gloves should be taped to the suit at the wrists. Respirators must be worn with filters offering protection equal to or exceeding HEPA protection (High Efficiency Particulate Air). This filter is 99.97% efficient in removing monodisperse particles of 0.3 microns in diameter. National Institute of Occupational Safety & Health (NIOSH) approved particulate filters are the N100, R100 and P100. Detailed information on respiratory protection is available in the Occupational Safety & Health Administration (OSHA) standard 29 CFR 1910.134.
10. Provide the contracting entity with a copy of the abatement contractor's written hazard communication program.
11. Provide the contracting entity with a copy of the abatement contractor's written respirator program.
12. Provide specific detailed methods regarding how the building occupants will be protected from potential exposure. Protect building occupants by installing appropriate polyethylene isolation barriers. Clearly define isolated areas. The contractor must also identify all air intakes and exhausts for the building and must ensure these will not become potential sources of air contamination within the structure once removal is in progress.
13. Provide the specific method(s) by which negative pressurization will be maintained in the areas under abatement (e.g. location of the fans, operating capacities, CFM). Negative pressure is maintained by exhausting more air from a space than is added back by make up air. By maintaining this negative balance, potential contaminants are less likely to migrate from the abatement areas to other occupied spaces within the building. The continual operation of exhaust fans can create negative pressure in the abatement areas and occupied areas of the structure. Pressurization testing should be performed periodically, as negative air flow is affected by the HVAC system itself, local ventilation and weather changes.
14. Specifically list the method by which the negative pressurization will be maintained during the course of abatement.
15. Indicate specifically where any exhaust fans installed will exhaust from the building. Ensure that all exhaust fans will not deliver contaminated air to an area outside the building near any fresh air intake. Further, ensure that the locations prevent contaminated air from re-entering the building by any means or manner.
16. Specifically list the method(s) by which personnel performing the abatement will be decontaminated: where the decontamination showers will be located, how the runoff water will be contained and disposed of; the type of biocide used for decontamination of equipment and reusable PPE.
17. Specifically list the method(s) by which the waste material will be removed from the work area (e.g. placed into plastic bags of what thickness and composition, placed into boxes, etc.).
18. Specifically list the method of removing the waste from the building as well as the path that will be used if the material must be taken through the facility. The process of removing the waste from the building must not increase potential exposure to building occupants.
19. Once all the bulk material has been removed, wet cleaning can be used to remove any remaining contamination. Wet cleaning should be done using a 1:10 bleach solution. If any dry material is left, or if wet cleaning is not possible, the remaining material should be vacuumed using a HEPA vacuum. Provide the specifications for the HEPA vacuum to be used. Specifications should include name of manufacturer, capability of the machine, and proof that the machine is in fact equipped with HEPA filtration.
20. List the ultimate destination site for contaminated materials removed.



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REFERENCES:

*Histoplasmosis: Protecting Workers at Risk*, DHHS (NIOSH) Publication No. 97-146, 1997, Center for Disease Control and Prevention [<http://www.cdc.gov/niosh/hi97146.html>]

*Handbook of Pest Control*, Arnold Mallis, 6<sup>th</sup> ed., 1993.

*Guidelines for the Prevention of Opportunistic Infections in Persons Infected with HIV*, USPHS/IDSA, 1999.

Kenneth S. Ridlon, Environmental Engineer, Comm. of Mass., DOS, personal communication with Amy Smoker, Microbiologist, National Antimicrobial Information Network (NAIN), Oregon State University/USEPA, 2/28/00, 3/2/00.

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U.S. Dept. of Fish and Wildlife, Dept. of the Interior publication 143, *House Bat Management*, 1982.